

LAKE COUNTY, ILLINOIS

2012 LAKE CHARLES SUMMARY REPORT

PREPARED BY THE
LAKE COUNTY HEALTH DEPARTMENT
Population Health Environmental Services



Lake Charles Fishing Pier
Photo Credit: Daily Harold

Lake Charles is a man-made lake located within the Village of Vernon Hills. The lake has a surface area of 39.4 acres and a maximum depth of 10.0 feet. The Village of Vernon Hills actively manages the lake for non-motorized boating, fishing, irrigation, and aesthetics.

The Lake Charles shoreline length is 1.1 miles. The western and southern shores are next to the

White Deer Run Golf Course. The eastern shore was deeded to the Vernon Hills Park District in 2003 totally 56.6 acres of land and water. By 2005 Lake Charles Park was completed with additional development funding from an Illinois Open Space and Land Acquisition Development grant.

Lake Charles receives water from the Seavey Drainage Ditch at the north end of

the lake; water enters the lake from its approximate 3530 acre watershed and exits the lake through a concrete spillway at the south end of the lake. Water leaving Lake Charles flows to Little and Big Bear Lakes, then into Indian Creek and eventually into the Des Plaines River. The primary land uses within the Lake Charles watershed are, single family homes, and transportation.

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ENVIRONMENTAL SERVICES WATER QUALITY SPECIALISTS

Kelly Deem

kdeem@lakecountyil.gov

Kathy Paap

kpaap@lakecountyil.gov

Gerald Urbanozo

gurbanozo@lakecountyil.gov

LAKE FACTS**Major Watershed:**

Des Plaines

Sub-Watershed:

Indian Creeek

Surface Area:

39.41 acres

Shoreline Length:

1.18 miles

Maximum Depth:

10.90 feet

Average Depth:

5.45 feet

Lake Volume:

214.20 acre-feet

Watershed Area:

3529.87 acres

Lake Type:

Impoundment

Current Uses:fishing, non-power
boating, and aesthetics**LAKE SUMMARY (CONTINUED)**

Many water quality parameters have not significantly changed since 2000, while some nutrient concentrations had considerable variations. Total phosphorus concentrations in Lake Charles averaged 0.093 mg/L in 2012 which is a 60% increase from the 2000 concentration of 0.058 mg/L. Total phosphorus levels that are above 0.050 mg/L exceed the Illinois Environmental Protection Agency (IEPA) impairment level. Nitrogen is the other nutrient critical for algal growth. The 2012 nitrate/nitrite concentration for Lake Charles was less than 0.165 mg/L which was lower than the 2000 value by 173% (0.450 mg/L). A total nitrogen to total phosphorus (TN:TP) ratio of 11:1 indicates that there was enough nitrogen and phosphorus to support excessive plants and algae.

Also using phosphorus as an indicator, the trophic state index (TSIp) ranked Lake Charles as eutrophic with a TSIp value of 69.40.

The 2012 average total suspended solids (TSS) concentration for Lake Charles (15.1 mg/L) was nearly double the 2012 county median (7.9 mg/L) and a slight reduction from the 2000 value of 16.3 mg/L. Water clarity was measured by Secchi depth, with the lowest reading in August (1.50 feet) and the deepest in June (3.00 feet). The average Secchi depth for the season was 2.20 feet which was below the county median (2.99 feet).

Conductivity concentrations, are correlated with chloride concentrations, the average conductivity reading for Lake Charles was 0.7846 mS/cm, which was slightly below the

county median (0.8020 mS/cm) and a 23% increase from 2000 (0.6374 mS/cm). The chloride concentration in Lake Charles in 2012 was 153 mg/L which is concurrent with the county median of 153 mg/L.

Aquatic plant sampling was conducted on Lake Charles in July. Only six species of plants and one macro-algae were present covering 64% of the lake. Eurasian Watermilfoil (EWM), was dominant, found at 51% of the sampling sites. Coontail and White Water Lily were also abundant occupying 43% and 36% of the lake, respectively. EWM is an exotic and invasive species that tend to crowd out native species when left unmanaged. Current EWM populations are impairing the recreational uses of the lake.

WATERSHED

Everyone lives in a watershed! A watershed is an area of land where surface water from rain and melting snow meet at a point, such as a lake or stream.

Which watershed do you live in?

The source of a lake's water supply is very important in determining its water quality and choosing management practices to protect the lake. A watershed is an area of land where surface water from rain and melting snow meet at a point, such as a lake or stream. The watershed of Lake Charles encompasses approximately 3530 acres, draining large residential areas to the west and north of

the lake. The size of the watershed feeding the lake relative to the lake's size is also an important factor in determining the amount of pollutants in the lake. The watershed to lake surface area ratio of 88:1 is large. This is can present a challenge when identifying and correcting pollutant sources of serious water quality problems that often accompany larger watersheds to lake ratios.

The principal water source in Lake Charles comes from the drainage of the land within the watershed by means of Seavey Drainage Ditch. Precipitation has a direct effect on the volume of the lake as storm runoff is directed from impervious surfaces into the lake. A concrete spillway located on the southern side of the lake is the outlet of Lake Charles. Water leaving Lake Charles

LAKE CHARLES WATERSHED (CONTINUED)

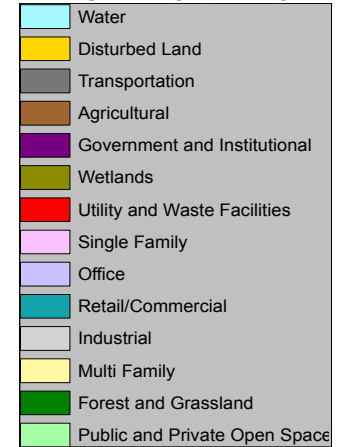
flows to Little and Big Bear Lakes, then into Indian Creek and eventually into the Des Plaines River. Retention time, the amount of time it takes for water entering a lake to flow out of it again, was calculated to be approximately 21 days. Based on the 2012 data, the current external sources affecting Lake Charles were from the following land uses: single family homes (43%), and

transportation (17%). Based on the amount of impervious surfaces each land use contributes varied amounts of runoff. Because impervious surfaces (parking lots, roads, buildings, compacted soil) do not allow rain to infiltrate into the ground, more runoff is generated than in the undeveloped condition. The major sources of runoff for Lake Charles were single transportation (38%) and

family homes (34%).

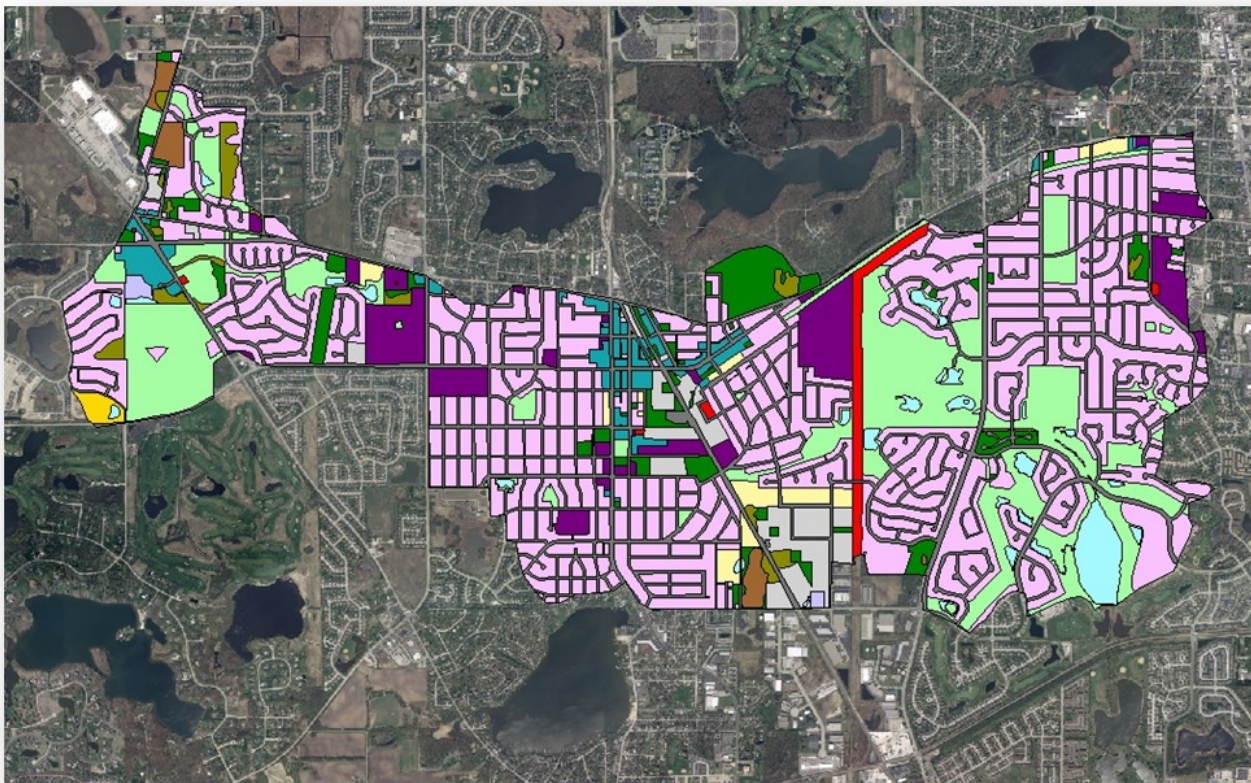
Controlling water that runs from the land's surface into the lake is important for drainage lakes. The areas of public and private open space around the lake play a part in absorbing nutrients before entering the lake. However large portions of runoff entering the lake via Seavey Drainage Ditch do not have a chance to be absorbed before entering Lake Charles.

2012 LAND USE IN THE LAKE CHARLES WATERSHED



IMPOUNDMENT

A MANMADE LAKE CREATED BY DAMMING A STREAM. AN IMPOUNDMENT IS ALSO DRAINED BY A STREAM.



Direction of watershed:

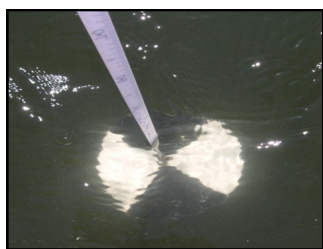
Water drains into Lake Charles from the delineated land. Water leaving Lake Charles flows south to Little and Big Bear Lakes, then into Indian Creek and eventually into the Des Plaines River.

VOLUNTEER LAKE MONITORING PROGRAM

The VLMP was established in 1981 to gather information on Illinois inland lakes, and to provide an educational program for citizens. The primary measurement by volunteers is the secchi depth (water clarity). Other observations such as water color, suspended algae and sediment, aquatic plants and odor are also recorded. The sampling season is May through October with measurements taken twice a month. In 2012 there were **50 lakes** participating in Lake County.

For more information visit:

www.epa.state.il.us/water/vlmp/index.html



A Secchi disk is an eight-inch plate painted black and white. A calibrated rope is used to lower the disc into the water and measure the depth to which it is visible.



WATER CLARITY

Water clarity is an indicator of water quality related to chemical and physical properties.

Measurements taken with a Secchi disk indicate the light penetration into a body of

water. Algae, microscopic animals, water color, eroded soil, and resuspended bottom sediment are factors that interfere with light penetration and reduce water transparency.

The 2012 average water clarity in Lake Charles was 2.20 feet; this was a 4% increase in the lake's transparency since 2000 (2.11 feet) and remains below the county median of 2.99 feet.

TOTAL SUSPENDED SOLIDS

Another measure of water clarity is turbidity, which is caused by particles of matter rather than dissolved organic compounds. Suspended particles dissipate light, which affects the depth at which plants can grow. The total suspended solid (TSS) parameter (turbidity) is composed of nonvolatile suspended solids (NVSS), non-organic clay or sediment materials, and volatile suspended solids (TVS) (algae and other organic matter).

2012 TSS concentrations averaged 15.1 mg/L which was above the county median of 8.6 mg/L and a 7% decrease since the 2000 average concentration of 16.3 mg/L. High TSS values are typically correlated with poor water clarity (Secchi disk depth) and can be detrimental

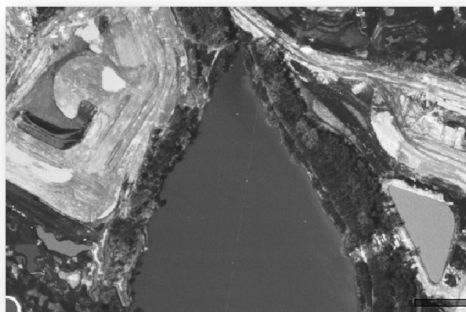
to many aspects of the lake ecosystem including the plant and fish communities. As TSS concentrations increased from the spring to the summer Secchi depth decreased.

The average calculated nonvolatile suspended solids (NVSS) was 9.97 mg/L for the 2012 sampling season. This means that 34% of the TSS concentration in 2012 can be attributed to organic particles, such as algae and 66% can be attributed to non-organic particles such as sediment. However NVSS concentrations in Lake Charles are significantly influenced by storm events, on average 83% of NVSS was attributed to sediments following rain events in 2012.

There are internal and external sources of sediment

affecting the turbidity in Lake Charles. Internal sources of sediment suspension include a large common carp population. Common carp are one of the most damaging aquatic invasive species due to their feeding behavior that disrupts shallowly rooted plants, decreasing water clarity. As water enters the lake from the Seavey Drainage Ditch, sediments are transported into the lake from bank erosion and other sources in the watershed. Aerial photos from 1997 and 2011 illustrates the noteworthy accumulation of sediment in the lake. Due to the large amount of residential area in the Lake Charles watershed residents should be mindful of their land management practices and the impacts to the lake.

Aerial Photos Illustrating Sedimentation in Lake Charles, 1997 (left) and 2011 (Right)



NUTRIENTS

Organisms take nutrients in from their environment. In a lake, the primary nutrients needed for aquatic plant and algal growth are phosphorus and nitrogen. In most lakes, phosphorus is the limiting nutrient, which means everything that plants and algae need to grow is available in excess: sunlight, warmth, and nitrogen. Nitrogen, as well as carbon, naturally occur in high concentrations and come from a variety of sources (soil, air, etc.) which are more difficult to control than sources of phosphorus. Lakes that are phosphorus-limited may be easier to manage, since controlling phosphorus is more feasible than controlling nitrogen or carbon. In Lake Charles, there was enough nitrogen and phosphorus to support excessive plants and algae.

The 2012 average total phosphorus (TP) concentration in Lake Charles was 0.093mg/L this was a 60% increase from the 2000 concentration (0.058 mg/L) and above the 2012 county

median of 0.067 mg/L.

Lakes with concentrations exceeding 0.050 mg/L can support high densities of algae and aquatic plants, which can reduce water clarity and dissolved oxygen levels and are considered impaired by the IEPA. Phosphorus originates from a variety of sources, many of which are related to human activities which include: human and animal waste, soil erosion, detergents, septic systems, common carp, and runoff from lawns. Increases in TP were correlated with increases in the NVSS concentrations indicating that sediment is a major source of TP in Lake Charles.

Nitrogen is the other nutrient critical for algal growth. Total Kjeldahl nitrogen (TKN) is a measure of organic nitrogen, and is typically bound up in algal and plant cells. The average 2012 TKN for Lake Charles was 1.07 mg/L, which was below the county median of 1.16 mg/L and an 12% increase from the 2002 concentration (0.95

mg/L). The inorganic form of nitrogen is also important for plant growth and was analyzed in the form of Nitrate ($\text{NO}_3\text{-N}$). In 2000 nitrate nitrogen was high in May, June, and July. Sources of this nitrogen could be numerous, but could have washed in with the high levels of sediment from the Seavey Drainage Ditch or from runoff from the golf course. Golf courses use large amounts of nitrogen fertilizer, particularly in the spring, to maintain the course's fairways and greens. In May of 2012 0.165 mg/L of nitrate/nitrite was detected while the remainder of the season concentrations was below the detection limit. In 2012 significant reductions of nitrate was documented June through September when compared to the 2002 concentrations, <0.05 mg/L and 0.374 mg/L. This implies that nitrate concentrations in Lake Charles are influenced by runoff, as 2012 was a drought year and above average rainfall occurred in 2000.

WHAT HAS BEEN DONE TO REDUCE PHOSPHORUS LEVELS IN LAKE CHARLES

December 2008–

Vernon Hills passed an ordinance prohibiting the use of lawn fertilizers containing phosphorus

July 2010- The State of Illinois passed a law to reduce the amount of phosphorus content in dishwashing and laundry detergents

July 2010- The State of Illinois passed another law restricting the use of lawn fertilizers containing phosphorus by commercial applicators.

LAKE CHARLES HAS ENOUGH NUTRIENTS TO SUPPORT EXCESSIVE PLANTS AND ALGAE

WHAT YOU CAN DO TO PROTECT LAKE CHARLES

*Do not throw leaves, grass clippings, pet waste, other organic debris into the street or driveway.

Runoff carries these through storm sewers, directly to Sand Lake.

*Build a rain garden to filter run-off from roofs, driveways, streets. This allows the phosphorus to be bound to the soil so it does not reach surface waters.

*Sweep up fertilizer that is spilled or inadvertently applied to hard surface areas, do not hose it away.



LOW NUTRIENTS:

Lakes are generally clear, deep and free of weeds or large algae blooms. Though beautiful, they are low in nutrients and do not support large fish populations.



MEDIUM NUTRIENTS:

Lakes that are between high and low levels of nutrients are devoid of oxygen in late summer, their hypolimnions limit cold water fish and cause phosphorus cycling from sediments.



HIGH NUTRIENTS:

Lakes are high in nutrients, are usually either weedy or subject to frequent algae blooms, or both. These lakes can support large fish populations, but are also susceptible to oxygen depletion.

**THE CRITICAL VALUE FOR
CHLORIDES IN AQUATIC
SYSTEMS IS 230 MG/L.**



**230 mg/L = 1 teaspoon
of salt added to
5 gallons of water.**

ICE FACTS

1. De-icers melt snow and ice. They provide no traction on top of snow and ice.
2. Anti-icing prevents the bond from forming between pavement and ice.
3. De-icing works best if you plow/shovel before applying material.
4. Pick the right material for the pavement temperatures.
5. Sand only works on top of snow as traction. It provides no melting.
6. Anti-icing chemicals must be applied prior to snow fall.
7. NaCl (Road Salt) does not work on cold days, less than 15° F.

CONDUCTIVITY

Another parameter measured during 2012 that is important in comparing data from year to year is conductivity. Conductivity is the measure of different chemical ions in solution. As the concentration of these ions increases, conductivity increases. The conductivity of a lake is dependent on the lake and watershed geology, the size of the watershed flowing into the lake, the land uses within that watershed, and evaporation and bacterial activity. Conductivity has been shown to be highly correlated (in urban areas) with chloride ions found in road salt mixtures. Water bodies most subject to the

impacts of road salts are streams, wetlands or lakes draining major roadways. In 2012, Lake Charles average conductivity was 0.7846 mS/cm. This was a 23% increase from 2000 (0.6374 mS/cm), however the 2012 remained below the county median of 0.8020 mS/cm. One of the most common dissolved solids is road salt used in winter road deicing. Most road salt is sodium chloride, calcium chloride, potassium chloride, magnesium chloride or ferrocyanide salts. Lake Charles 2012 average chloride concentration was 153 mg/L. These values are influenced by the winter road maintenance of Illinois Route

176 and Butterfield Road. The United States Environmental Protection Agency has determined that chloride concentrations higher than 230 mg/L can disrupt aquatic systems. Chlorides tend to accumulate within a watershed as these ions do not break down and are not utilized by plants or animals. High chloride concentrations may make it difficult for many of our native species to survive. However, many of our invasive species, such as Eurasian Watermilfoil, Cattail and Common Reed, are tolerant of high chloride concentrations.

WHAT HAS BEEN DONE TO REDUCE CHLORIDE LEVELS IN LAKE CHARLES

Village of Vernon Hills Public Works:

Uses a 300-gallon tank on a pickup truck and an environmentally friendly alternative to salt, a liquid by-product consisting of salt, calcium chloride, and beet juice that adheres to pavement for up to 5 days. The department has halved salt consumption – from 600 to 300 pounds per lane mile,

This liquid has several advantages:

1. Beet juice adds moisture to help salt work better.
2. Lowers the working temperature of salt to around 20 degrees (below zero).
3. Creates a composition that sticks to the pavement versus dry salt that can bounce off of the pavement.
4. Reduces salt use by 20%.
5. Environmentally friendly product.

Lake County Division of Transportation:

Is enhancing efficiency of snow removal, and going green through innovation and technology. Global positioning systems (GPS) on snow plows are providing real-time tracking of these vehicles, as well as the application of salt and de-ice materials. The data is then used to better coordinate and target services, saving on salt and gas.

Effectiveness of Salt as a Deicing Agent Based on Pavement Temperature °F

Pavement Temp. °F	One Pound of Salt (NaCl) melts	Melt Times
30°	46.3 lbs of ice	5 min.
25°	14.4 lbs of ice	10 min.
20°	8.6 lbs of ice	20 min
15°	6.3 lbs of ice	1 hour
10°	4.9 lbs of ice	Dry salt is ineffective and will blow away before it melts the ice

LAKE LEVEL

Lakes with stable water levels potentially have less shoreline erosion problems. A fluctuation in Lake Charles water level was observed during the sampling season. Data from the Stormwater Management Commission's Lake Zurich rain gauge was correlated to rain events as the lake levels increased. Over the sample period May to September the lake level decreased 0.15 feet. The lake level of Lake Charles does not appear to be greatly influenced by rain events.

The retention time of Lake Charles is very quick (21 days) despite the storm water it receives from its watershed and storm drains. The highest lake level occurred in May after the addition of 4.21 inches of rain. The driest weather during the sampling period occurred in July (0.53 inches of rain) corresponding with the lowest lake level. The greatest monthly change in lake level (a decrease of 0.80 feet) occurred from June to July. According to the National Climatic Data

Center administered by the National Oceanic and Atmospheric Administration, the weather in Illinois from May to September in 2012 was unusually dry and warm. The 2012 nine month average temperatures were the second highest recorded on record since 1895. Only 1921 had higher average temperatures. In 2012 surrounding lake levels such as Harvey Lake and Diamond Lake were also considerably lower than average.

WANTED DEAD, NOT ALIVE INVADING SPECIES



INVASIVE EXOTIC PLANT SPECIES AROUND LAKE CHARLES. AS IT ESTABLISHES AND EXPANDS, IT OUTCOMPETES AND REPLACES NATIVE PLANTS THAT PROVIDE A HIGHER QUALITY SOURCE OF NUTRITION FOR WILDLIFE.

SHORELINE PLANT SURVEY

In July 2012, a shoreline vegetation survey was conducted at eight sites; the sites were evenly spaced around the perimeter of the lake four on the east side and four on the west side. The species encountered were documented, and quantified as present or absent. Seventy-five species were present, and 15 were exotic. The most common species documented was Common Evening Primrose (*Oenothera biennis*) observed at seven sample locations.

Other common species included Reed Canarygrass, Riverbank Grape, Swamp Verbena, Softstem Bulrush, Swamp Smartweed, Rice Cutgrass and Canada Thistle. Reed Canarygrass is an invasive exotic species, when

left unmanaged populations can result in the suppression of the native plant community creating a monoculture that disrupts food sources and cover for wildlife. Reed Canarygrass was the second most dominant species documented along the Lake Charles shoreline with the exception of sites 1 and 3. Another exotic Canada Thistle was present at five sample locations (sample sites 1, 3, 6, 7, 8) primarily on the northwestern portion of the lake. Lake Charles has two distinctly different shoreline types; the east side of the lake demonstrates a more natural shoreline with an average of 24 shoreline plant species while the western shoreline was more managed with an average of 12 species at the sample locations.



8 SHORELINE PLANT SAMPLE LOCATIONS ON CHARLES LAKE

AQUATIC PLANTS

The tips of the braches are crowded with leaves giving it a "Coontail" resemblance.



COONTAIL

*CERATOPHYLLUM
DEMERSUM*

OVERWINTERS AS A EVERGREEN PLANT, IT PROVIDES IMPORTANT HABITAT TO MANY INVERTEBRATES AND PROVIDES FISH WITH YEAR ROUND HABITAT.

DISTRIBUTION OF RAKE DENSITY ACROSS ALL SAMPLES SITES IN 2012 (SEE MAP TO RIGHT)

Rake Density (Coverage)	# of Sites	%
No plants	17	36
>0 to 10%	2	4
>10 to 40%	6	13
>40 to 60%	6	13
>60 to 90%	8	17
>90%	8	17
Total Sites with Plants	30	64
Total # of Sites	47	100

Plants growing in our lakes, ponds, and streams are called macrophytes. These aquatic plants appear in many shapes and sizes. Some have leaves that float on the water

surface, while others grow completely underwater. In moderation, aquatic plants are aesthetically pleasing and desirable environmentally. Their presence is natural and normal in lakes.

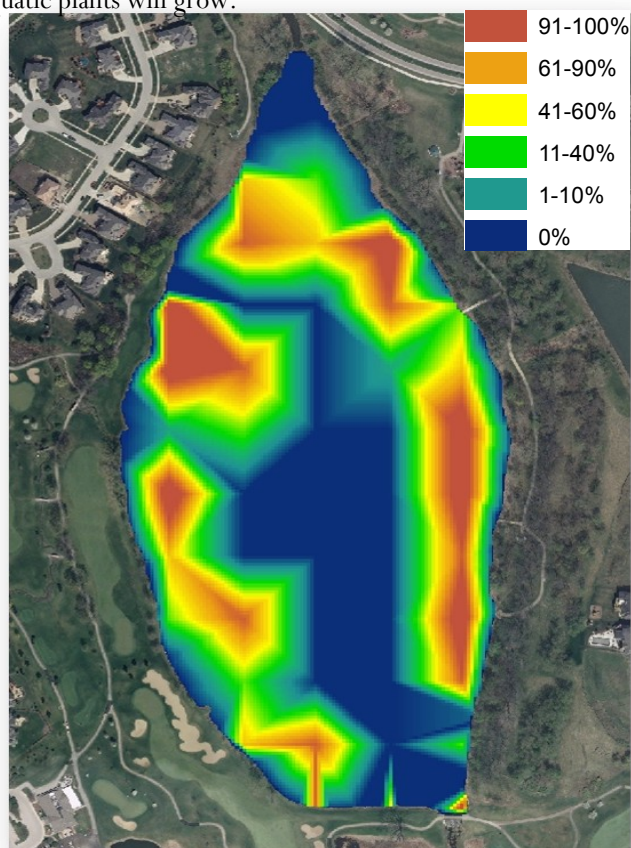
Aquatic plant sampling was conducted on Lake Charles in July 2012. There were 47 points generated based on a computer grid system with points 60 meters apart. Aquatic plants occurred at 30 of the sites (64 % total lake coverage) that included one macro-algae and 6 aquatic plant species, including two exotic invasive species; Eurasian Watermilfoil and Curlyleaf Pondweed. The aquatic plant species composition changed from 2000 to 2012 with the absence of American Pondweed and Small Pondweed, and the presence of Chara, Duckweed, and White Water Lily. In 2012 the most common species was Eurasian Watermilfoil and Coontail at 51% and 43% of the sampled sites, respectively while White Water Lily and Sago Pondweed was common at 36% and 19% of the sampled sites, respectively. The overall aquatic plant density has not significantly changed since 2000. This is mostly

contributed to the significant increase in the Coontail and White Water Lily populations, and decrease in Curlyleaf Pondweed.

Coontail is a submersed aquatic plant with coarse, bushy stems and no roots. Lacking true roots, the plants may drift between a variety of depths during the growing season. Coontail overwinters as an evergreen plant, providing habitat to invertebrates and fish year round.

The diversity and extent of plant populations can be influenced by a variety of factors. Water clarity and depth are the major limiting factors in determining the maximum depth at which aquatic plants will grow.

When the light level in the water column falls below 1% of the surface light level, plants can no longer grow. The 1% light level in Lake Charles reached the lake bottom, indicating that plants could occupy 100% of the lake. Plants were found at a maximum depth of 5.5 feet. A healthy aquatic plant population is critical to good lake health. Aquatic vegetation provides important wildlife habitat and food sources. Aquatic vegetation provides important wildlife habitat and food sources. Additionally, aquatic plants provide many water quality benefits such as sediment stabilization and competition with algae for available resources.



FLORISTIC QUALITY INDEX

Floristic quality index (FQI) is an assessment tool designed to evaluate the closeness the flora of an area is to that of undisturbed conditions. It can be used to: 1) identify natural areas, 2) compare the quality of different sites or different locations within a single site, 3) monitor long-term floristic

trends, and 4) monitor habitat restoration efforts. Each aquatic plant in a lake is assigned a number between 1 and 10 (10 indicating the plant species most sensitive to disturbance). This is done for every floating and submersed plant species found in the lake. An FQI is calculated by multiplying the average of these numbers by the square root of the number of these

plant species found in the lake. A high FQI number indicates that a large number of sensitive, high quality plant species present in the lake. Non-native species were also included in the FQI calculations for Lake County lakes. The median FQI for Lake County lakes from 2000 -2012 was 12.7. Lake Charles had an FQI of 9.0 ranking 109th out of 160.

**Lake County Median
FQI = 12.7**

AQUATIC PLANTS: WHERE DO THEY GROW?

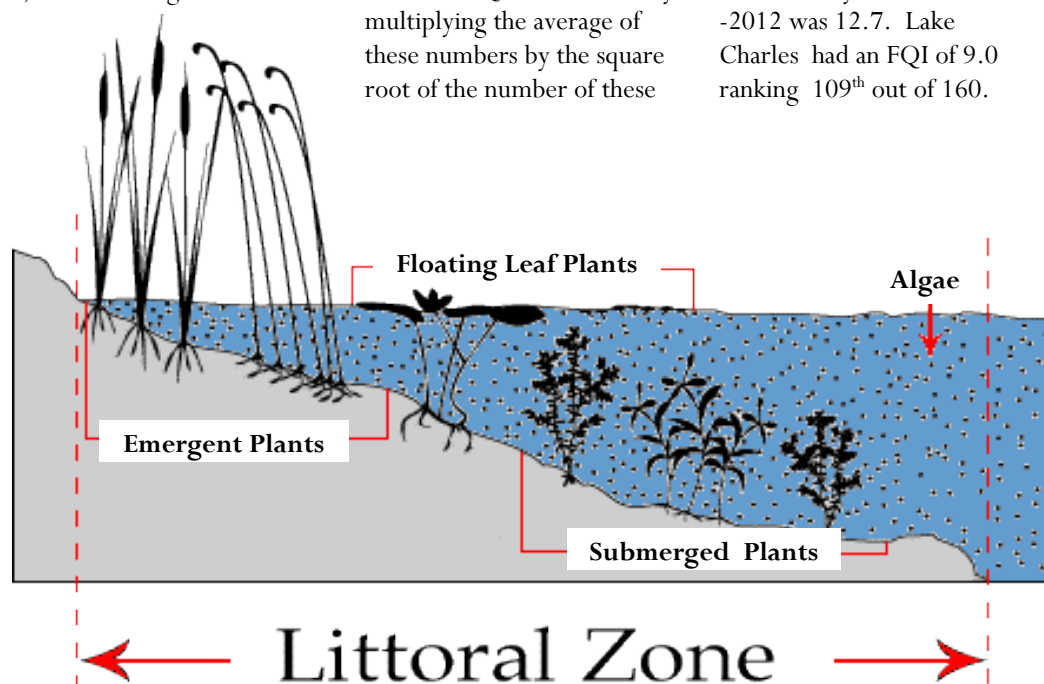
Littoral Zone— the area that aquatic plants grow in a lake.

Algae— have no true roots, stems, or leaves and range in size from tiny, one-celled organisms to large, multicelled plant-like organisms.

Submerged Plants— have stems and leaves that grow entirely underwater, although some may also have floating leaves.

Floating-leaf Plants— are often rooted in the lake bottom, but their leaves and flowers flat on the water surface.

Emergent Plants— are rooted in the lake bottom, but their leaves and stems extend out of the water.



Source: Minnesota Department of Natural Resources

IN MANY LAKES MACROPHYTES CONTRIBUTE TO THE AESTHETICALLY PLEASING APPEARANCE OF THE SETTING AND ARE ENJOYABLE IN THEIR OWN RIGHT. BUT EVEN MORE IMPORTANT, THEY ARE AN ESSENTIAL ELEMENT IN THE LIFE SYSTEMS OF MOST LAKES.

- Macrophyte leaves and stems provide a habitat or home for small attached plants and animals. Some are microscopic in size and some are larger. These attached organisms are valuable as food for animals higher in the food chain, such as fish and birds.
- Many types of small organisms live in the sediment. There are insects that spend the immature stages of life in the sediments, leaving when they become adults. Decomposing plant life provides part of the food supply for these sediment-dwelling organisms and the emerging insects, in turn, are food for fish.
- The submerged portions of macrophytes provide shelter and cover for small or young fish from larger fish that would feed on them.
- Types of plants that extend above the water can provide cover for waterfowl and their young, and many plants can serve directly as food for certain types of waterfowl.
- Aquatic plants provide many water quality benefits such as sediment stabilization and competition with algae for available nutrients.

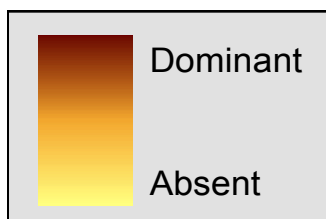
ILLUSTRATION OF EURASIAN WATERMILFOIL

illustration provided by:
IFAS, Center for Aquatic Plants
University of Florida, Gainesville, 1990



EURASIAN WATERMILFOIL *MYRIOPHYLLUM SPICATUM*

IS A FEATHERY
SUBMERGED AQUATIC
PLANT THAT CAN
QUICKLY FORM THICK
MATS IN SHALLOW
AREAS OF LAKES.



EURASIAN
WATERMILFOIL
DENSITY AT 47 SITES
ON LAKE CHARLES IN
JULY, 2012,
MAXIMUM DEPTH
THAT PLANTS WERE
FOUND WAS 4.5 FEET
(RIGHT).

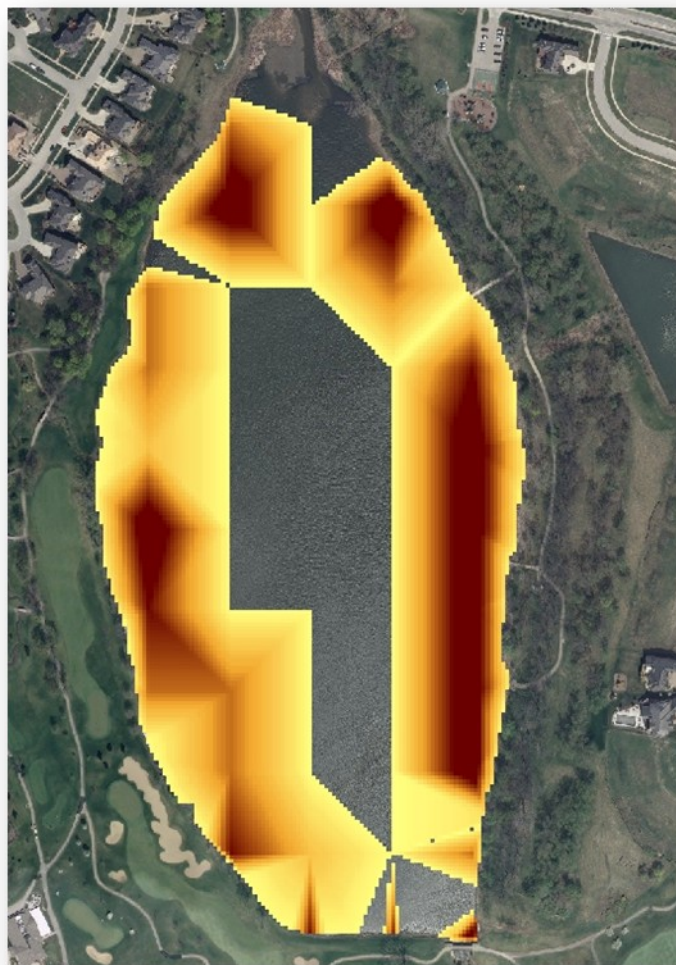
Eurasian Watermilfoil (EWM) is a feathery submerged aquatic plant that can quickly form thick mats in shallow areas of lakes and rivers in North America. These mats can interfere with swimming and entangle propellers, which hinders boating fishing, and waterfowl hunting. Matted milfoil can displace native aquatic plants, impacting fish and wildlife. Since it was discovered in North America in the 1940's, EWM has invaded nearly every US state and at least three Canadian Provinces. Milfoil spreads when plant pieces break off and float on water currents. It can cross land to new waters by clinging to sailboats, personal watercraft, powerboats, motors, trailers, and fishing gear.

In 2007 the Vernon Hills Public Works Department hired a private consulting firm to stock and monitor a native weevil (*Euhrychiopsis lecontei*) as a biological control method for EWM in Lake Charles. In July, 2007 5,000 weevil eggs were stocked at a singular near shore area in the south eastern portion of the lake. For three consecutive years the weevil and EWM populations was monitored at the stocking location and three additional sampling sites to evaluate the effectiveness of the weevil at reducing EWM populations. For three consecutive years declines in the EWM population was documented at the stocking

and sampling location 1; however the weevil population did not expand in Lake Charles to the other sampling sites and EWM populations continued at nuisance levels. The 2007 weevil stocking did not prove to be an effective method for controlling EWM population in the lake as a whole or as a long term management tool. The 2012 EWM populations were present at 51% of the lake and most dense on the eastern and western portions of the lake at depths of two to four feet.

An aquatic plant management

plan is critical to maintaining the health of the lake and a balanced aquatic plant community. The plan should be based on the management goals of the lake and involve usage issues, habitat maintenance/restoration, and limitations of the lake. The primary focus of the plan must include the control of exotic aquatic species including EWM and Curlyleaf Pondweed. Follow up is critical to achieve long-term success. A good aquatic plant management plan considers both the short and long-term needs of the lake.



CURLYLEAF PONDWEED

Curlyleaf Pondweed (CLP) is an invasive aquatic perennial that is native to Eurasia, Africa, and Australia. It was accidentally introduced to United States waters in the mid-1880s by hobbyists who used it as an aquarium plant. The leaves are reddish-green, oblong, and about 3 inches long, with distinct wavy edges that are finely toothed. The stem of the plant is flat, reddish-brown and grows from 1 to 3 feet long. This aquatic plant has an unusual life history. Unlike our native pondweeds it begins growing

in the early spring. CLP has even been documented growing under the ice in lakes! The plant then reaches maturity in mid summer typically June in Lake County when our natives are starting to emerge. CLP becomes invasive in some areas because of its adaptations for low light tolerance and low water temperatures which allow the plant to get a head start and outcompete native plants in the spring. In mid-summer, when most aquatic plants are growing, CLP plants are dying off. Plant die-offs may

result in a critical loss of dissolved oxygen. Large populations of CLP also can cause changes in nutrient availability. In midsummer, CLP plants usually die back which is typically followed by an increase in phosphorus availability that may fuel nuisance algal blooms. CLP can form dense mats that may interfere with boating and other recreational uses. In July 2012 in Lake Charles CLP was present, with plants only being found at 1 sample site. The 2012 weather may have influenced the amount of

CLP documented in 2012, due to the warmer temperatures and time of sampling CLP population may have been under represented. Curlyleaf Pondweed populations documented in the 2000 lake study were abundant, however neither the 2000 or the 2012 CLP populations were causing fluctuations in nutrient availability.

The Lake Charles aquatic plant management plan should prioritize the reduction in CLP populations while densities are low. This could be accomplished by manually removing the plants using an aquatic plant rake. This method also eliminates or reduces the need for chemicals treatments that would require alternative applications than those that target EWM.

ILLUSTRATION OF CURLYLEAF PONDWEED



CURLYLEAF PONDWEED *POTAMOGETON CRISPUS*

HAS A TOLERANCE FOR LOW LIGHT AND WATER TEMPERATURES THAT ALLOW THE PLANT TO GET A HEAD START. BY MID SUMMER, CURLYLEAF PLANTS ARE DYING OFF. WHICH MAY RESULT IN A CRITICAL LOSS OF DISSOLVED OXYGEN AND AN INCREASE IN NUTRIENTS.



ILLUSTRATED LEFT
CURLYLEAF
PONDWEED FOUND
AT ONE SAMPLING
SITE IN JULY 2012
AT THE SOUTHERN
END OF THE LAKE



AQUATIC HERBICIDES-ENDOTHALL

CHEMICAL APPLICATIONS FOR ALGAE IS A TEMPORARY SOLUTION THAT OFTEN REQUIRES MULTIPLE APPLICATIONS AS THE TREATED ALGAE SINK TO THE BOTTOM TO DECOMPOSE (USE OXYGEN) THEY RELEASE NUTRIENTS THAT THE SURVIVING ALGAE USES TO REBOUND.

Hydrothal® 191 is a herbicide produced from endothall salts, this potassium salt formulation does not adversely affect fish populations when applied correctly at application rates less than 1.0 ppm. Hydrothal® 191 is a contact herbicide that causes localized injury to plant tissue where contact occurs. While this herbicide requires reasonably good distribution to be effective, its rapid action

makes it effective in slow moving waters. This non-selective herbicide is used to reduce the populations of a broad range of aquatic plants and algae. Hydrothal® 191 is typically used in irrigation canals or as spot treatments around dock or swimming areas. Ted Gray, of Living Waters Consultants treatments used Hydrothal® 191 to reduce Chara populations in a 1.5 acre parcel in southwest portion of

Lake Charles. Chara is a macro algae that can reach nuisance levels, however Chara also offers sediment stabilization and competition for resources with planktonic algae and EWM. Special care in the timing of the application of this product should be considered, Sago Pondweed and Coontail are also sensitive to Hydrothal® 191, for a healthy aquatic plant community these populations need to expand.

NEW PERMIT REQUIREMENTS FOR APPLYING PESTICIDES IN WATERS

**FOR FULL
DETAILS OF THE
RULE SEE:**

[HTTP://
WWW.EPA.STAT
E.IL.US/WATER/
PERMITS/
PESTICIDE/
INDEX.HTML](http://www.epa.state.il.us/water/permits/pesticide/index.html)

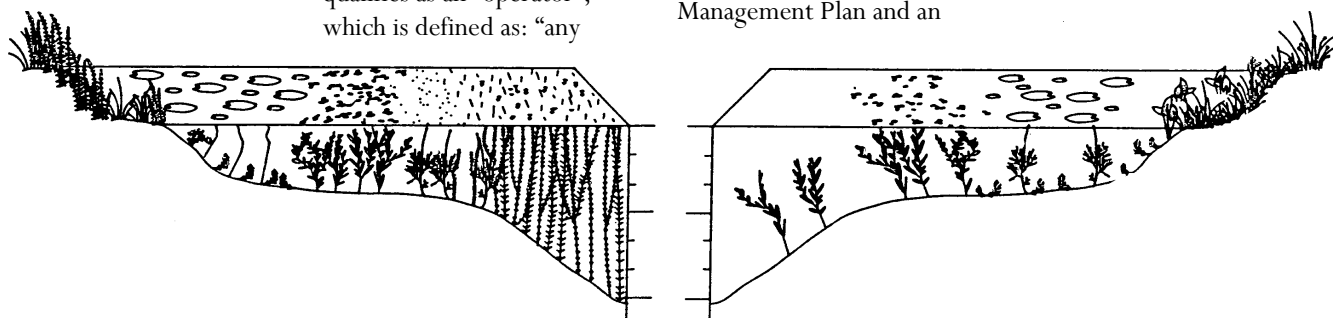
New regulations are now in effect that will significantly affect how pesticides are used in Illinois waters. A National Pollutant Discharge Elimination System (NPDES) permit will now be required to apply any type of pesticides over or into waters of the State. In Illinois, the permitting process will be administered through the Illinois Environmental Protection Agency (IEPA).

Who has to get a permit? According to the language in the permit, anyone who qualifies as an "operator", which is defined as: "any

person, persons, group, or entity in control over the financing for, or over the decision to perform pest control activities, or applying pesticides that will result in a discharge to waters of the State". Homeowner associations or even individuals may need to get a permit. Regardless of the size of treatment, a permit will be needed. If the treatment area or total annual area exceeds certain thresholds then additional requirements will be required such as a Pesticide Discharge Management Plan and an

annual report. The thresholds vary depending on type of treatment. For weed and algae control, the threshold is 80 acres of treatment or 80 linear miles along the water's edge. The threshold is an annual total, so for example, algaecides applied to five acres four times during the year, would meet this 80 acre threshold requirement.

Anyone or any group planning to treat their pond or lake with pesticide this year should take into account these new requirements.



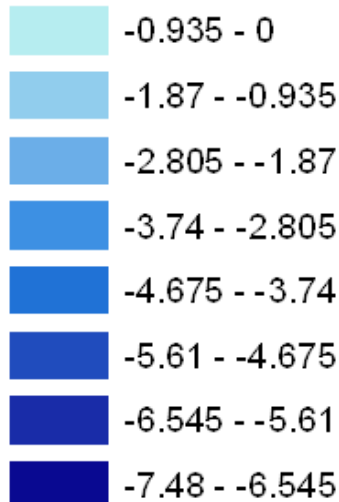
A KEY TO A HEALTHY LAKE IS A WELL-BALANCED AQUATIC PLANT POPULATION

BATHYMETRIC MAP

MORPHOMETRIC DATA

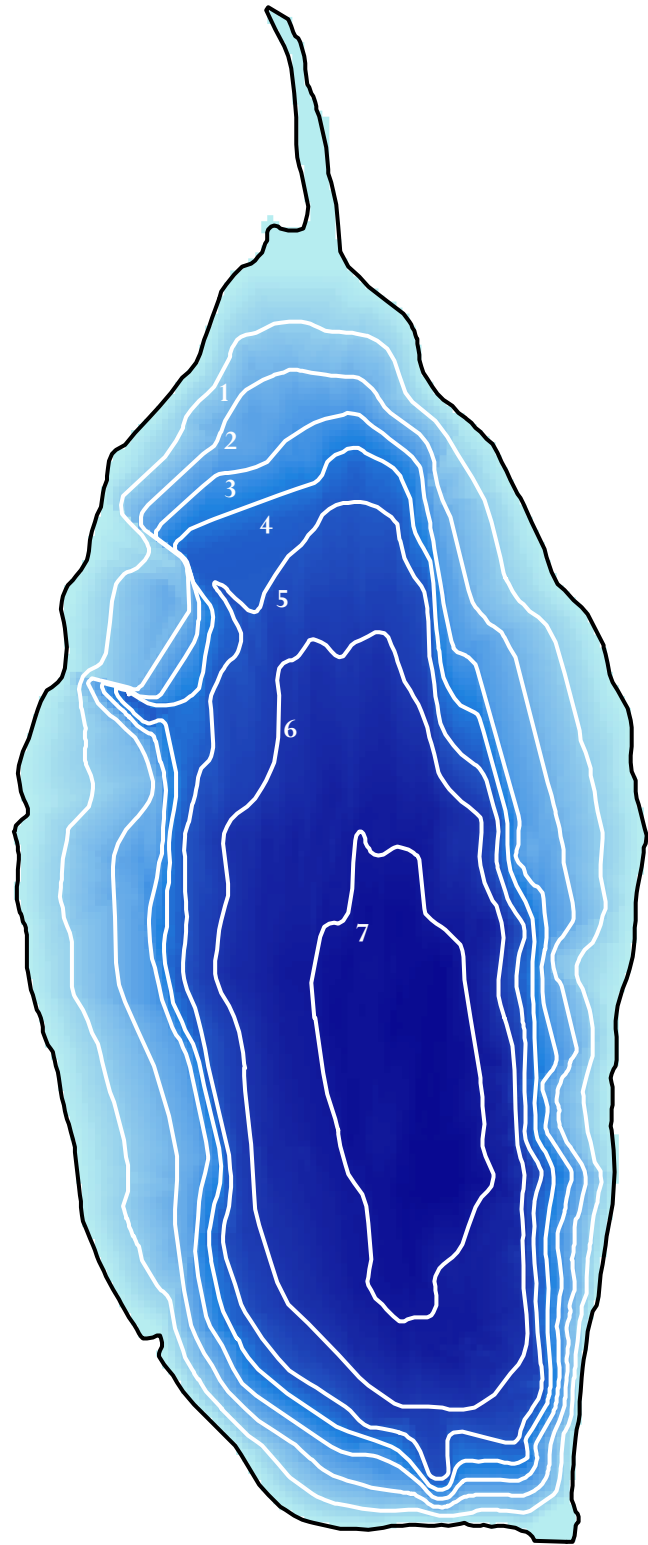
Surface Area: 37.55 acres
Maximum Depth: 7.50 feet
Average Depth: 3.84 feet
Shoreline Length: 1.03 miles

ELEVATION



A bathymetric (depth contour) map is an essential tool for effective lake management since it provides critical information about the physical features of the lake such as depth, surface area, and volume. This information is particularly important when intensive management techniques such as chemical treatments for plant or algae control, dredging, fish stocking or habitat enhancement are part of the lake's overall management plan.

In April, 2013 the LCHD-ES collected the field data to create a bathymetric map of Lake Charles. Field data was collected using Biosonics equipment along with a Trimble GPS unit with sub-foot accuracy. Once collected, the data was analyzed and imported into ArcGis for further analysis. In ArcGis, the contours were drawn and the volume was calculated.



Contour (Feet)	Area Enclosed (Acres)	Percent of total acres
0	37.55	100%
1	31.08	83%
2	25.47	68%
3	21.31	57%
4	18.78	50%
5	15.67	42%
6	10.98	29%
7	3.42	9%

Survey Data Collected April 2013. This map is intended for water quality reference only, not intended for navigational, swimming, or driving purposes.



ENVIRONMENTAL SERVICES

Senior Biologist: Mike Adam

madam@lakecountyil.gov

Population Health Services
500 W. Winchester Road
Libertyville, Illinois 60048-1331

Phone: 847-377-8030

Fax: 847-984-5622

For more information visit us at:

[http://www.lakecountyil.gov/
Health/want/BeachLakeInfo.htm](http://www.lakecountyil.gov/Health/want/BeachLakeInfo.htm)

Protecting the quality of our lakes is an increasing concern of Lake County residents. Each lake is a valuable resource that must be properly managed if it is to be enjoyed by future generations. To assist with this endeavor, Population Health Environmental Services provides technical expertise essential to the management and protection of Lake County surface waters.

Environmental Service's goal is to monitor the quality of the county's surface water in order to:

- Maintain or improve water quality and alleviate nuisance conditions
- Promote healthy and safe lake conditions
- Protect and improve ecological diversity

Services provided are either of a technical or educational nature and are provided by a professional staff of scientists to government agencies (county, township and municipal), lake property owners' associations and private individuals on all bodies of water within Lake County.

LAKE RECOMMENDATIONS

In general, Lake Charles 2012 water quality was comparable to 2000. Minimal changes in, total suspended solids, conductivity, and water clarity. Some changes in the nutrient concentrations occurred, however these parameters could be influenced by the drought conditions and/or sampling time. There were several variations to the 2012 aquatic plant community when compared to the 2000. Primary concerns include an increase in Eurasian Watermilfoil and the presence of Curlyleaf Pondweed, although populations were reduced.

Lake Charles, lake's management is administered by two primary entities; the Village of Vernon Hills Park District and White Deer Run Golf Course. To improve the overall quality of Lake Charles, the ES (Environmental Services) has the following recommendations:

- **Develop an aquatic plant management plan that targets the reduction of Eurasian Watermilfoil and increases species diversity**
- **Target Curlyleaf Pondweed while populations are low**
- **Participate in the Volunteer Lake Monitoring Program**
- **Install a permanent staff gage to monitor lake level fluctuations**
- **Assess current fish population to improve fish stocking programs and determine water quality impacts by Common Carp**
- **Shoreline plant management should include removal of Reed Canarygrass along the entire lake shoreline**
- **Develop a monitoring program to identify upstream sediment issues**

